CLAIMS

What is claimed is:

1. A system comprising:

an optical signal source; and

an integrated circuit operatively coupled to the optical signal source, the integrated circuit including:

a substrate, and

a plurality of regions formed in the substrate and having refractive indices different from that of the substrate, the plurality of regions and intervening areas of the substrate forming a grating, the grating having a plurality of grating periods with substantially constant pitch, wherein each grating period of the plurality of grating periods includes a region of the plurality of regions, the plurality of regions having regions of at least two different widths.

2. The system of claim 1, wherein for each grating period of the plurality of grating periods, a grating period adjacent to that grating period has a region having a width is different from the width of that grating period's region.

3. The system of claim 1, wherein the plurality of regions are filled trenches formed in the substrate, the material filling the trenches being different from the material of the substrate.

4. The system of claim 1, wherein the plurality of regions is formed from polysilicon and the substrate is formed from crystalline silicon.

5. The system of claim 1, wherein the plurality of regions are formed proximate to a buried insulator layer of a silicon-on-insulator (SOI) wafer.

6. The system of claim 1, further comprising forming a cladding layer on the substrate and the plurality of regions.

7. The system of claim 1, wherein a rib waveguide is formed in the substrate, the rib waveguide containing the plurality of regions.

8. The system of claim 1, wherein the substrate and the plurality of regions form a Bragg grating.

9. The apparatus of claim 8 wherein the waveguide Bragg grating has less than 1000 grating periods with an enhanced extinction ratio of more than 10 dB over non-apodized waveguide Bragg grating.

10. The system of claim 9, wherein the waveguide Bragg grating's Bragg wavelength is electronically tunable.

11. The system of claim 9, wherein the waveguide Bragg grating's Bragg wavelength is thermally tunable.

12. A method, comprising:

propagating an optical beam through a Xth region of a plurality of regions, the Xth region having a first width, wherein the plurality of regions are formed in a substrate, the substrate having a refractive index different from the refractive indices of the plurality of regions, and wherein the plurality of regions and intervening areas

of the substrate form a grating, the grating having a plurality of grating periods of substantially constant pitch, each grating period of the plurality of grating periods including a region of the plurality of regions, the Xth region being contained in a Xth grating period of the plurality of grating periods; and

propagating the optical beam through a Yth region of the plurality of regions, the Yth region having a second width different from the first width and contained in a Yth grating period of the plurality of grating periods, the Yth grating period being adjacent to the Xth grating period.

13. The method of claim 12, further comprising propagating the optical beam through a Zth region of the plurality of regions, the Zth region having a third width different from the second width and contained in a Zth grating period of the plurality of grating periods, the Zth grating period being adjacent to the second grating period, wherein the second width is greater than both the first and third widths.

14. The method of claim 12, wherein the plurality of regions are polysilicon-filled trenches formed in the substrate, the being formed from crystalline silicon.